

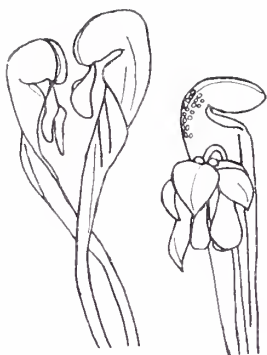
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CARNIVOROUS PLANT NEWSLETTER

VOLUME 8, Number 1

MARCH, 1979





CARNIVOROUS PLANT NEWSLETTER



Volume 8, Number 1
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Cover

Young pitcher on a seedling plant of *Nepenthes gracilis* X *N. x hookeriana* — cultivated type. Hybrid made at California State University, Fullerton by L. Song.

Photo by J. Mazrimas

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your subscription to CPN:

All correspondence regarding subscriptions, address changes and missing issues should be sent to Pat Hansen, c/o The Fullerton Arboretum, California State University, Fullerton, CA 92634. DO NOT SEND TO THE CO-EDITORS. Checks for subscriptions and reprints should be made payable to CSUF FOUNDATION — ARBORETUM.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.
Copy deadline for the June issue is May 1, 1979.

CO-EDITORS:

D. E. Schnell, Rt. 4, Box 275B, Statesville, NC 28677

J. A. Mazrimas, 329 Helen Way, Livermore, CA 94550

T. L. Mellichamp, Dept. of Biology, UNCC, Charlotte, NC 28223

Leo Song, Dept. of Biology, California State University, Fullerton, CA 92634

SECRETARY-TREASURER: Pat Hansen, c/o The Fullerton Arboretum

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Editor's Corner

A sincere welcome to all you newcomers and welcome back for you oldtimers as we begin another year. As stated in the last issue, each issue this year will be dedicated to a specific group of CP. This issue is dedicated to the fascinating tropical pitcher plants, *Nepenthes*.

Much has been said about the Endangered Species Act of 1973. A convention was held in San Jose, Costa Rica on 19-30 March 1979. Several genera of CP are among the proposed additions to Appendix I (Endangered) and Appendix II (Threatened). The ones that are being proposed to add to Appendix I are (the country proposing is in parenthesis): *Byblis* spp. (Australia), *Drosera* spp. (India), and *Nepenthes* spp. (India). Threatened addition is *Cephalotus follicularis* (Australia). (See Federal Register Vol. #11, Tuesday, 16 January 1979, pp. 3384-3400). It is obvious that the addition of whole families and genera in some cases (*Drosera* and *Nepenthes*, for

example) to these appendices is not totally logical. Readers are urged to express their opinions to their elected representatives as well as to Dr. Richard L. Jachowski, Federal Wildlife Permit Office, US Fish and Wildlife Service, Washington, DC 20240 (tel. 703/235-2418). Unfortunately, by the time you read these words, it will already be too late to influence the U.S.'s position at the San Jose meetings. More details will be given as they become known.

In response to the need for more responsible implementation of the Endangered Species Conservation Act of 1973, especially as it applies to the Plant Kingdom, a group of interested individuals ranging from professional botanists and horticulturists to laypersons have formed an organization called "The National Consortium for Plant Conservation" (2000 Cabrillo Highway; Pacifica, CA 94044 USA; tel. 415/355-4845). Interested persons should contact them at the above address.

Carnivorous Plant Clubs

Club: Carnivorous Plant Society (Britain)

Address: Arncliffe Park, Bicester, Oxfordshire OX6 0NT

President: John Watkins

Meetings: Inquire

Publications: Journal published twice a year

Dues: Alistair Mackie (address above), 2.50 in U.K., 3.50 overseas

Club: Potomac Valley Carnivorous Plant Society

Address: 1705 N. Quebec St., Arlington, VA (meeting location)

President: Philip Sheridan, 5729 S. 2nd St., Arlington, VA 22204 (write for info)

Meetings: Third Sunday of every month

(exc. Dec.)

Publications: Color bulletin twice a year, subscription \$4.00/year

Dues: \$2.00 (in addition to bulletin subscription), restricted to area members.

Field trips: (1) Pine Barrens: May 26. Meet at 9:00 a.m. at Chatsworth General Store, depart for home approximately 4 p.m. Sights: *S. purpurea* will be in flower, ecology of bogs may be observed. (2) Pine Barrens: July 22. Time and location same as above. Sights: Bladderworts and droseras will be in flower. (3) Southern Virginia: August 12, Homeville. We will split up into groups and explore for possible sites of CP.

SPECIAL NOTICE

CPN Co-Editor Leo Song will speak on Carnivorous Plants at the Green Scene, a plant and flower show to be held on the campus of California State University, Fullerton, at 2:15 p.m. on Saturday, April 21, 1979. After the talk, Leo will lead a tour of the greenhouse for those interested in seeing the CSUF CP collection, which features a particularly

good selection of *Nepenthes*.

Green Scene hours are 11 a.m. to 5 p.m., Saturday and Sunday, April 21 and 22. Admission: \$.50 for members of the Friends of the Arboretum, \$1.00 for non-members. Location: The University Center on the CSUF campus, near the northeast corner of State College Blvd. and Dorothy Lane in Fullerton.

Seed Bank

PATRICK DWYER (St. Michael's Episcopal Church, 49 Killian Park, Albany, NY 12205) writes regarding the seed bank:

Keep the seed donations coming in! Try to get seed donations into the seed bank before the first of the month before each issue of CPN; that is when the seed inventory is sent in. This will insure that the seeds are as fresh as possible. Please make sure that the seeds are fresh, viable, and correctly labeled, as we have no way of checking them.

We would like to know how much success people have had with germinating seeds from the seed bank. We are also asking people to donate gemmae of pygmy *Drosera* and small root cuttings of plants like *D. binata* & *Cephalotus*. These would then be available at a small cost to donors to the seed bank.

Thank you again for everyone's help and support.

(Patrick's report and inventory were accompanied by \$200 which will be used to help defray printing costs of CPN. The editors again wish to thank Patrick for the many hours he devotes to the Seed Bank.)

To send seed: Please remove seed from the seed capsules and place it in small envelopes (preferably paper so that they dry out enough to prevent mold). Label

with the origin and date of collection, including habitat if it is exotic. Fold the envelope over once or twice before taping so that the seeds don't stick to the tape. After the seed is received it will be placed in smaller packets; donors will be informed of how many packets they have donated. A donation of 10-19 packets earns one free seed packet of comparable rarity, with one free for each additional 10 packets.

Do not ask to trade for seed from the bank. Everyone will have to buy all but their free packets. When you send seed, indicate whether it is for the seed bank, for Patrick's seed project or for a personal trade. The seed bank is separate from his collection.

To order seed: Please enclose payment. List the seeds desired and an equal number of substitutes in order of preference. If requested, Patrick will add any cultural instructions of which he is aware. Patrick will answer all letters and orders as quickly as possible. If you receive no response within two weeks (U.S.) to a month (outside U.S.) please write again. Each issue of CPN will include an update of the inventory.

Cost per packet: 50¢

(Number of packets is listed if less than 15 are available)

SEED BANK INVENTORY

January 27, 1979

Byblis liniflora (5), *Darlingtonia californica*, *Dionaea muscipula*, *Drosera aliciae* (11), *D. aliciae* (pink flower), *D. anglica*, *D. auriculata*, *D. binata* (12), *D. brevifolia* (6), *D. burkeana* (8), *D. burmannii*, *D. capensis*, *D. capensis* (narrow), *D. capensis* (mix), *D. capillaris*, *D. capillaris* (long leaf), *D. capillaris* (pink flower) (7), *D. capillaris* (white flower) (10), *D. capillaris* (mix) (10), *D. filiformis* (5), *D. filiformis filiformis*, *D. glanduligera* (14), *D. indica* (red flower), *D. intermedia*, *D. "Lake Badgerup"* (white flower) (8), *D. macrantha*, *D. montana* (10), *D. montana* (white flower), *D. natalensis*, *D. pelata*, *D. pygmaea* (2), *D. rotundifolia*, *D. rotundifolia* (Oregon type), *D. spathulata*, *D. spath.* (Australian), *D. spath.* (Kansai), *D. spath.* (Kanto), *D. spath.* (round leaf — Japan) (2), *D. spath.* (white flower) (6), *D. spath.* (mix) (2), *D. whittakerii*, *D. sp.* (mix of US rosette types) (3), *D. sp.* (3), *Nepenthes khasiana*, *N. x chelsonii x rafflesiana* (Singapore), *N. x chelsonii x williamsii*

(10), *N. x intermedia x rafflesiana* (Singapore), *N. x morganii x williamsii*, *N. rafflesiana* (vittata) *x rafflesiana* (Singapore) (10), *Pinguicula lusitanica*, *P. vulgaris* (5), *Sarracenia alata* (14), *S. alata* (purple throat) (5), *S. alata* (x-ray, 100 rads), *S. alata* (x-ray, 550 rads) (2), *S. flava*, *S. flava* (Gulf) (9), *S. flava* (Gulf — hvy veined), *S. flava* (Gulf — red w/green lid) (2), *S. flava* (Gulf — yellow/hvy veined mix), *S. leucophylla*, *S. leucophylla* (yellow fl.) (5), *S. minor*, *S. oreophila*, *S. psittacina* (4), *S. psittacina* (Gulf), *S. purpurea*, *S. purpurea purpurea*, *S. purpurea venosa*, *S. purpurea venosa* (pink fl.), *S. rubra* (Gulf), *S. rubra alabamensis*, *S. rubra jonesii*, *S. rubra wherryi*, *S. alata x leuco.*?, *S. alata* (purple) *x leuco.*, *S. alata x psitt.* (yellow) (2), *S. x harperii* (6), *S. leuco. x purp.* (3), *S. leuco. x rubra*, *S. minor x psitt.* (various hybrids & back crosses), *Sarr. hybrid mix* (1), *Sarr. mix*, *Utricularia juncea* (10), *U. subulata* (9).

CPN Nepenthes cutting distribution program

Good news for *Nepenthes* growers! This year we have a super collection of cuttings for those interested in trying their luck. However, with last year's toll on Joe Mazrimas' bank account — he never received payment for a number of orders — a number of changes in the program have been made. Briefly, the following rules have been set.

1. Cuttings will be available at U.S. \$2.50 per variety, three varieties for U.S. \$5.00, shipping being postpaid by UPS or first class airmail. Customers outside of the U.S., Canada and Mexico please enclose U.S. \$.50 extra per variety to cover the added cost of postage.
2. All orders must be prepaid in U.S. funds payable to the CSUF Foundation - Arboretum. L. Song will accumulate the orders, so your requests should be addressed to him at the address found in the inside front cover of CPN.
3. Include your current list of *Nepenthes* in cultivation. We will select new varie-

ties to add to your collection. If we cannot add to your variety, please indicate whether a refund should be made or cuttings be sent.

4. All orders will be sent during the first two weeks of May, 1979. Foreign orders will be given priority shipment; all others will be filled as per the date received. Foreign orders please include the cost of a U.S. Phytosanitary Certificate (U.S. \$5.00) plus any other paperwork needed to pass through *your* customs and agricultural quarantine.
5. Donation cuttings are solicited and will be exchanged on a type for type basis. Persons donating cuttings should enclose a list of their collection with their cuttings which should be sent during the last week of April or first week of May to Bob Hanrahan; Rt. 3, Box 338T, Arroyo Grande, CA 93420. Be sure that each batch is separately and clearly labeled.
6. Each set of cuttings (2-3/type) will

be prepared by dipping or dusting in a rooting hormone prior to shipping and will have at least three full leaves to provide plenty of photosynthetic surface area.

7. A limit of 9 types (U.S. \$15 total for cuttings plus cost of any extras as previously pointed out) per person.

8. Rooting instructions will be provided for each order.

The above stated rules are not intended to discourage the distribution of *Nepenthes*. Their sole purpose is to improve the program so it may continue and grow in the future to encompass a greater selection of species and hybrids.

News and Views

WALTER GREENWOOD (1838 Menold Ct., Allison Park, PA 15101) sends the following:

I noted, in the December, 1979 (CPN 7:97-98) News and Views section, Bill Carroll's use of Mir-Acid on *Pinguicula lutea* seedlings. I have been using this fertilizer, during the past eight months, on *Cephalotus* and *Nepenthes*. Bi-monthly applications of a dilute ($\frac{1}{4}$ strength or less) solution have resulted in lush, prolific pitcher and leaf production in *Cephalotus*. Growth of *Nepenthes* is also benefitted by this treatment, but in some cases pitcher production is slowed or interrupted temporarily. For *Nepenthes* I would recommend a more dilute solution and smaller doses.

I have also been working with *Aldrovanda* and various commercial aquarium algacides. Several algacides I have tried effectively control and prevent algal blooms, but can also damage the *Aldrovanda*. When and if I find a safe algicide or safe dosage levels for those I have already tried, I will report them to you.

I still hope to start a CP society here in western Pennsylvania, but although I received many kind offers of interest and assistance from various parts of the country, the response from Pennsylvania was decidedly meager. I would like, perhaps, to start an organization which could coordinate various local groups' efforts to create a greater interest in my area and in

others. One of my dearest dreams is to help organize a national CP meeting, an idea which several others have written to me about. In the meantime, I am assembling a library of books, articles, etc., on CP and related subjects. Any donations of reprints, copies or other materials, or even information on how I can obtain them, will be greatly appreciated.

JIM KOROLAS (36 Eastlea Crescent, Agincourt, Ontario, MIT 3A6, CANADA) has the following comments: Regarding Review of Recent Literature, Gordon C. Tucker (Rhodora 80:596-597) and his finding *D. filiformis* on Rhode Island (CPN 7:105), I think it is quite possible for *D. filiformis* to be found on Rhode Island, since *D. filiformis* is also found in Shelburne County, Nova Scotia (WYNNE 1944, and DOWHAN 1978). Also, it is found in Connecticut. However, *D. filiformis* is listed as rare in these two areas.

Since I'm on the topic of rare plants, I think CPN readers would care to know about the following bit of information. *P. vulgaris* is listed rare in Nova Scotia, found only in Inverness County, and St. Paul Island. The rare *Utricularia* include *U. gibba*, *U. radiata* (!), *U. resupinata*, and *U. sublata*. Unfortunately, I do not know where in Nova Scotia these plants are found, but it would be safe to say in

the North Western Region of the Province.

DON SCHNELL (Rt. 4, Box 275B, Statesville, NC 28677) has some comments on Paul McMillan's *Sarracenia* note in the December, 1978 CPN (CPN 7:105-107). Regarding *S. flava* variants, the large form with the "purple throat" does indeed seem the dominant variant in the Gulf coastal plain, particularly in southern Georgia. However, variants other than this are occasionally found in the otherwise monotonous Georgia stands, particularly in bogs and savannahs off US 1 from Lyons south. In western Florida, the other variants (including all those described in my 1978 *S. flava* paper on Carolian stands — *Castanea* 43:1-20) become quite common. These can be easily noted in the mega-acreage savannahs along I-10 just east of the Alabama-Florida line, and further east to Tallahassee as well. In fact, the "sixth Variant" I alluded to in my paper as being quite rare in the Carolinas and which was therefore not further mentioned (green-veined lid with red tube) becomes rather common in certain Florida locations. At the other end of the range, the tall purple throated *S. flava* is very commonly found in the Carolinas. Such pitchers commonly to 40 inches are located in relict piedmont bogs ten minutes from my home. Pocosins in the Green Swamp region commonly have acres of this variant ranging to 48 inches or more in height. Granted, numbers are decreasing, but this is secondary to the activities of man, not an expression of the way it was before human colonization and exploitation. My *S. flava* paper contains evidence clearly indicating that these variants are not simply ecophenes but are genetic. Whether this genetic plasticity is an expression of evolutionary plasticity with capability to expand into different kinds of environments remains to be shown.

S. alata is readily found east of Mobile

Bay, particularly in a large bog north of Gulf Shores, AL. It can be found less frequently in a few residual "pocket" bogs still further east, but I have not found unequivocal specimens in Florida. The once more extensive savannahs of southern Bladwin County, AL have been largely converted to potato and soybean farming.

Concerning *S. flava* v. *rugelii* as a taxonomic entity at present, I stand by my comments in the *Castanea* paper, these being negative.

Finally, I quite agree with Paul that the huge gaps in our knowledge about coastal plain geologic history preclude any sort of detailed historical geography of *Sarracenia*. To name just a few of several dozen problems, 1) current river and other drainage courses are not necessarily those extant during early *Sarracenia* dispersal, 2) The "third dimensions" of time and lateral dispersal flows are poorly understood, 3) There apparently have been several re-inundations of at least the lower terraces of the coastal plain since the "uplift". I agree with Wherry's early broad 1930's concepts on *Sarracenia* geography simply because they are not overdrawn and fit what we do know. I was very conservative with historical geographic speculation in my *Castanea* paper for the same reason. I have read one or two current accounts of *Sarracenia* historic geography which are at best over-extended and fanciful.

STEVE SMITH (RD #1, Box 296, Kirkwood, NY 13795) writes: My biggest hassle here is my poor water. I have my own well and the pH is approximately 8.5. I didn't realize this until the end of summer. The alkalinity produced some strange effects on my CP collection. This was our first summer in the house, and I'm glad that I only lost a few plants, but a majority were stunted. I lost a

(Please turn to Page 35)

Short Notes

HISTORY OF A MT. DAVIS BOG

by Paul McMillan
(2155 Old Patagonia Rd., Nogales, AZ 85621)

An extremely interesting bog, now unfortunately flooded, existed 15 miles from my birthplace and former home in Meyersdale, Somerset Co., Penna. It was 15 miles from Meyersdale at the foot of Mt. Davis, (3,000 ft. plus), Penna.'s highest mountain. It occupied a small portion of a much larger marsh which was nearly two miles long in a deep valley between two parallel ridges. It, too, was considered to be a Cretaceous relict bog and bordered the central stream of the entire huge marsh, Glade Run. The ecological conditions here were quite different though than those at the Chalk Hill Bog. The bog was on the 2,500 ft. level and this was considered to be the same level as the remnants of the old Schooley Peneplain of the Cretaceous in this area. This bog harbored a large population of *Sarracenia purpurea gibbosa* which was natural and not introduced, abundant *Drosera rotundifolia* and *Utricularia geminiscapa* and many other rare bog plants and orchids. The presence of the coastal plain (essentially) aroid, *Orontium aquaticum*, the Golden Club at its highest known station in the Penna. Appalachians was considered a strong indication floristically of the peneplain nature or origin of the bog. A friend of mine, Dr. Alta Schrock, did her master's and doctoral thesis on the ecology, flora and origins of this bog. Some sections were extremely dangerous and long poles in excess of 12 feet could be inserted into dark pools in some quaking mat sections and not begin to touch bottom. This bog was very deep and evidently was derived from a small lake or large pond with shallower edges leading out into the sedimentary, tall grass marsh adjoining it. At

one end, it had a large colony of dead trees which had been destroyed by a *rising* water table. This very peculiar situation gave Dr. Schrock one of her first keys to the unique set of ecological factors that were operating in this particular bog.

Dr. Schrock found, in taking core samples of the bog soil in the Mt. Davis Bog that layers of white sand occurred intermittently with layers of sphagnum peat and the indications of her studies on pollen analysis and other factors were that the springs feeding the bog from underground periodically varied their water output and raised the water level in the bog high enough and often enough to kill off encroaching climax vegetation like red maples, hemlocks and shrubs like rhododendron which would have shaded and crowded out the carnivores and other typical bog plants. The layers of white sand between the peat layers indicated the increased force and volume of water flowing out of the feeding underground streams. Remains of large preserved tree trunks in the bog peat itself where these trees no longer survived showed how peculiar local conditions had operated over tremendous periods of time to preserve this bog for abnormally long periods of time. The Western Penna. Botanical Society tried to purchase the bog as did Dr. Harned, a well-known deceased conservationist of the area but the owners of the whole marsh opted in favor of the dam in which many have subsequently drowned.

I mention all of these details just to illustrate how peculiar local factors can determine the ultimate longevity of a particular bog.

THRIPS AND NEPENTHES

By Bill Hanna

New Lambton, Newcastle., 2305 Australia

Thrips (Thysanoptera), when they infest a *Nepenthes* plant, are capable of doing considerable damage; ultimately, if the symptoms are not recognised in time, they are capable of killing a plant. Because of their size and inconspicuous colours, it is quite possible for the insects to pass unnoticed even in large quantities, for they are but 1/25 to 1/50 of an inch long. Depending on the species, they are capable of producing numerous generations during summer. Their mouth consists of a series of delicate piercing stylets enclosed in a short, sucking tube or mouth cone. When feeding, the stylets are first driven into the plant tissue; as the cell sap escapes the minute puncture, the apex of the mouth cone is applied to it and the plant juices are pumped up through the tube by special muscles. During this feeding it is possible for them to spread virus diseases by migrating from infected plants and feeding on healthy ones.

There are many varieties of thrip and judging by some of their characteristic colours I would say that my plants have been attacked by two or more at one time. Their colours are in the browns, reds, greys and black. Infestation by thrips takes on the following symptoms: in some cases the leaves take on a withered, leathery look, the leaves becoming buckled and twisted, tending to die back at the tips. In all cases the new growth is for smaller than previous leaves; as the infestation progresses these new leaves may even take on a yellowy grey appearance.

Thrips live under the leaves and generally the injury can be seen on the underside; it takes the form of "silvering." This silvered effect comes from coalescence of the whitish patches caused by thrips sucking out the cell contents. Large colonies (typical brown or black dots)

can even be seen on this "silvering." In the later stages of infestation the thrips feed on the upper leaf surface. If not checked soon, almost certainly death will occur.

Thrips can prove difficult to control, and generally at least two treatments at least two weeks apart are required, for the eggs are laid within the plant tissue which gives good protection, and this also gives time for pupae in the sack to emerge as adult thrips. I have used Maldison (Malathion) with great success, the concentration used being 1 fl. oz. of 25% concentrated in 1½ gallons water; Dimethoate (Rogor), ½ fl. oz. of 30% concentrate in 4 gallons water; and Nicotine Sulphate, 1 fl. oz.; white oil emulsion, 10 fl. oz.; water, 4 gallons.

From personal experience I have found that perhaps even a third or fourth spraying may be necessary to eradicate this pest from the plant; but this can be judged for yourself by keeping an eye on the new growth.

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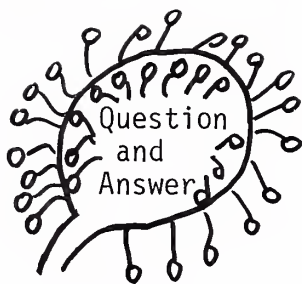
New South Wales Department of Agriculture
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Vol. 1-7 (pkg.)	34.00	40.00

Make check or money order payable
(in U.S. dollars) to CSUF FOUNDATION — ARBORETUM.



Question: Just lately some sort of larva has been attacking my CP plants and eating its roots and leaves. Is there anything I can do about it? I'm a newcomer to CPN — this will be my second year. The larva has eaten my 11-year-old bulb

(Venus's Fly trap). I would like to know exactly what happened to *Aldrovanda*? Can anyone send information on this plant? (D. B., Salt Lake City, Utah)

Answer: It is rather difficult to determine what type of larva may be attacking your plants, but a good drenching with a mild insecticide usually will solve the problem. Use a wettable powder preparation following the label instructions. A trip to the nursery and a question to the nurseryman should be sufficient. As to the *Aldrovanda*, the culture of this plant was covered in the December, 1978, issue of CPN. (LCS)

HYBRID NEPENTHES

(by Ron Fleming, P.O. Box 3834, Kenai, Alaska 99611)

The entries in this listing are itemized alphabetically by hybrid name followed by breeder's name, date of cross or commercial issue, "hybrid group," and, finally, a break-down of each hybrid to its supposed parent stock and hybridization structure. A good percentage of these *Nepenthes* hybrids are listed by names not acknowledged in formal horticultural publications and doubted by the professional community, as they may represent duplicate crossings of previously produced hybrids. *Nepenthes* X *fournieri* (Gautier, 1903) is an example of a cross between *N. northiana* and *N. maxima* which duplicates an earlier cross which produced *N. X mixta* (TIVEY, 1892). However, *N. X fournieri* does not exactly duplicate "the" *N. X mixta* in every detail. The "hybrid group" designation indicates a hybrid which is a near duplicate to one or more other named hybrids or back crossed hybrids, the group name

is generally taken from the earliest known hybrid of the group: Thus, *N. X fournieri* (Gautier, 1903, *mixta* group).

The heart of this listing is the complete break-down of each hybrid to its known or supposed parent stock in such a way as to show the intermediate steps that lead to the final hybrid as listed. As an example: *Nepenthes* X f. w. *moore* (Tivey, 1904, *dyeriana* group) = (*northiana* X *maxima*) X (*rafflesiana* X *veitchii*). Both primary hybrids, *northiana* X *maxima* (*N. X mixta*) and *rafflesiana* X *veitchii* (*N. X dicksoniana*), can easily be discerned while all the parent stock is shown as well. This type of listing should serve to better understand parent stock ratios in complicated crosses as well as an easy reference keying out hybrids of similar origins. It should be noted that many of the earliest hybrids are of doubtful parentage and many others may be now extinct.

Amabilis (, 1886, *excelsior* group) = (*rafflesiana* x *ampullaria*) x *rafflesiana*
Allardii (Allard, 1897, *tiveyi* group) = *veitchii* x *maxima*
Amesiana (Veitch, 1893, *excelsior* group) = *rafflesiana* x (*rafflesiana* x *ampullaria*)
 Dr. Edgar Anderson (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Atropurpurea (, *nobilis* group) = *sanguinea* x *maxima* 'superba'

Alliottii (, , *mixta* group) = *northiana* x *maxima*
Atro-sanguinea (Taplin, 1882) = (*distillatoria* x *gracilis*) x *khasiana*
Balfouriana (Tivey, 1899, *balfouriana* group) = (*northiana* x *maxima*) x (*sanguinea* x *khasiana*)
Bobnickii (Bonstedt, 1931, *mixta* group) = [(*northiana* x *maxima*) x *maxima*] x [(*northiana* x *maxima*) x *maxima*]
Boissiana (Jarry-Desloges, 1905) = [*maxima* x *veitchii*] x [*mirabilis* x (*rafflesiana* x *ampullaria*)]
Boissiensae (Lecoufle-Bert, 1955, *henryana* group) = *gracilis* x [(*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)]
Caroli-schmidtii (Bonstedt, 1931, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Chelsonii (Seden, 1872, *chelsonii* group) = (*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)
Chelsonii excellens (Tivey, 1900, *chelsonii* group) = *rafflesiana* x [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)]
Coccinea (Taplin, 1882, *wrigleyana* group) = (*rafflesiana* x *ampullaria*) x *mirabilis*
Compacta (Taplin, 1881, *wrigleyana* group) = (*rafflesiana* x *ampullaria*) x *mirabilis*
Courtii (Court, 1877, *dominii* group) = *gracilis* x (*rafflesiana* x *gracilis*)
Joseph Cuiak (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Cylindrica (Tivey, 1887) = *distillatoria* '*rubra*' x *veitchii*
Deslogesii (Jarry-Desloges, 1905, *deslogesii* group) = (*maxima* x *veitchii*) x (*northiana* x *maxima*)
Dicksontiana (Lindsay, 1888) = *rafflesiana* x *veitchii*
Dominii (Dominy, 1862, *dominii* group) = *rafflesiana* x *gracilis*
Dormanniana (Taplin, 1882, *dormanniana* group) = *mirabilis* x (*gracilis* x *khasiana*)
Dominii (Dominy, 1862, *dominii* group) = *rafflesiana* x *gracilis*
Dormanniana (Taplin, 1882, *dormanniana* group) = *mirabilis* x (*gracilis* x *khasiana*)
Dyeriana (Tivey, 1900, *dyeriana* group) = (*northiana* x *maxima*) x (*rafflesiana* x *veitchii*)
Edinensis (Lindsay, 1888, *chelsonii* group) = *rafflesiana* x [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)]
Excelsa () = *veitchii* x *sanguinea*
Excelsior (Taplin, 1885, *excelsior* group) = *rafflesiana* x (*rafflesiana* x *ampullaria*)
Eyermanni (Siebrecht, 1889, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Dr. D C Fairburn (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x *rafflesiana* x *gracilis*
Formosa (Kew Garden, 1897) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x *distillatoria*
Fournieri (Gautier, 1903, *mixta* group) = *northiana* x *maxima*
Gamerii (Jarry-Desloges, 1905, *deslogesii* group) = (*maxima* '*superba*' x *veitchii*) x (*northiana* x *maxima*)
Gautieri (Gautier, 1903, *mixta* group) = *northiana* x *maxima*
Goebellii (Bonstedt, 1931, *mixta* group) = (*northiana* x *maxima*) x *maxima*
Goettingensis (Bonstedt, 1931, *dyeriana* group) = (*northiana* x *maxima*) x (*rafflesiana* x *veitchii*)
Grandis (Jarry-Desloges, 1906, *deslogesii* group) = *maxima* '*superba*' x *northiana* '*pulchra*'
Harryana (natural hybrid complex) = *edwardsiana* x *villosa*
Henryana (Taplin, 1881, *henryana* group) = (*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)
Hibberdi (Taplin, 1883, *henryana* group) = (*rafflesiana* x *ampullaria*) x (*gracilis* x *khasiana*)
Hoeischeri (Bonstedt, 1931) = (*northiana* x *maxima*) x [(*gracilis* x (*rafflesiana* x *gracilis*)] x *distillatoria* '*rubra*'
Hookerae (Taplin, 1895) = *rafflesiana* x *mirabilis*
Hookeriana (H. Low) (natural hybrid complex) 1847 = *rafflesiana* x *ampullaria*
Nel Horner (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Hybrida (Dominy, 1866, *hybrida* group) = *khasiana* x *gracilis*
Hybrida maculata (Dominy, 1866, *hybrida* group) = *khasiana* x *gracilis*
Hybrida maculata elongata (Court, 1877, *dominii* group) = *gracilis* x (*rafflesiana* x *gracilis*)
Intermedia (Court, 1877, *dominii*) = *gracilis* x *rafflesiana*
Kinabaluensis (natural hybrid complex) = *rajah* x *villosa*
Krausii (Bonstedt, 1931, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Ladenburgii (Bonstedt, 1931, *mixta* group) = (*northiana* x *maxima*) x *maxima*
Lawrenciana (Taplin, 1880, *wrigleyana*) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Longicaudata (Jarry-Desloges, 1906, *mixta* group) = *maxima* '*superba*' x *northiana* '*pulchra*'
Lyrata (Court, 1877, *lyrata* group) = (*khasiana* x *gracilis*) x *rafflesiana*
Dr. John MacFarlane (*Veitch*, 1909, *nobilis* group) = *sanguinea* x *maxima* '*superba*'
Maria-Louisa (Gautier, 1903, *mixta* group) = *northiana* x *maxima*

Mastersiana (Court, 1881) = *sanguinea* x *khasiana*
Mercieri (Gautier, 1903, *mixta* group) = *northiana* x *maxima*
Merrilliata (natural hybrid complex) = *merrilliana* x *alata*
Mixta (Tivey, 1892, *mixta* group) = *northiana* x *maxima*
F. W. Moore (Tivey, 1904, *dyeriana* group) = (*northiana* x *maxima*) x (*rafflesiana* x *veitchii*)
Director G. T. Moore (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Katharine Moore (Pring, 1950, *dominii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Morganiana (Taplin, 1881, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Neufvilliana (Bonstedt, 1931, *mixta* group) = (*northiana* x *maxima*) x *maxima*
Nobilis (Veitch, 1910, *nobilis* group) = *sanguinea* x *maxima* 'superba'
Outramiana (Taplin, 1879, *henryana* group) = (*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)
Paradisae (Taplin, 1883, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Pateronii (Saul, 1889, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Paullii (Jarry-Desloges, 1906, *deslogesii* group) = (*maxima* 'superba' x *veitchii*) x (*northiana* x *maxima*)
Petersii (Bonstedt, 1931, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Picturata (Tivey, 1903, *dyeriana* group) = (*northiana* x *maxima*) x (*rafflesiana* x *veitchii*)
Pitcheri (Pitcher & Manda, 1895) = [*mirabilis* x (*rafflesiana* x *ampullaria*)] x [(*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)]
Leutenant R B Pring (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Rafflesiana pallida (Court, 1877, *lyrata* group) = (*khasiana* x *gracilis*) x *rafflesiana*
Ratcliffiana (Court, 1880, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Remilliensis (Jarry-Desloges, 1905, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Reutheri (Bonstedt, 1931, *balfouriana* group) = (*northiana* x *maxima*) x (*sanguinea* x *khasiana*)
Robusta (Taplin, 1880, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Rodigeri (Bonstedt, 1931, *mixta* group) = (*northiana* x *maxima*) x *maxima*
Rubro-maculata (Court, 1887) = (*khasiana* x *gracilis*) x *veitchii*
Rufescens (Court, 1888) = [*gracilis* x (*rafflesiana* x *gracilis*)] x *distillatoria* 'rubra'
Rutzi (Bonstedt, 1931, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Saint Louis (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Sedenii (Seden, 1872, *hybrida* group) = *gracilis* x *khasiana*
Henry Shaw (Pring, 1950, *chelsonii* group) = [(*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)] x [*rafflesiana* x *gracilis*]
Siebrechitiana (Siebrecht, 1889, *dormanniana* group) = *mirabilis* x (*gracilis* x *khasiana*)
Siebertii (Bonstedt, 1931, *deslogesii* group) = (*northiana* x *maxima*) x (*veitchii* x *maxima*)
Simonii (Gautier, 1903, *mixta* group) = *northiana* x *maxima*
Shinjuku (*shinjuku* group) = [*northiana* x *maxima*] x [*mirabilis* x (*rafflesiana* x *ampullaria*)]
Spredida (Pitcher & Manda, , *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Stammieri (Bonstedt, 1931, *mixta* group) = [(*northiana* x *maxima*) x *maxima*] x [(*northiana* x *maxima*) x *maxima*]
Stewartii (Court, 1879, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
Superba (Taplin, 1880, *henryana* group) = (*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)
Tiveyi (Tivey, 1897, *tiveyi* group) = *maxima* 'superba' x *veitchii*
Gerald Ulrichi (Pring, 1950, *chelsonii* group) = (*rafflesiana* x *gracilis*) x (*rafflesiana* x *ampullaria*)
Vallierae (Jarry-Desloges, 1905, *deslogesii* group) = (*maxima* 'superba' x *veitchii*) x (*northiana* x *maxima*)
Ventrata (natural hybrid complex) = *ventricosa* x *alata*
Williamsii (Taplin, 1880, *henryana* group) = (*gracilis* x *khasiana*) x (*rafflesiana* x *ampullaria*)
Wittei (Witte, 1897) = *maxima* x *stenophylla*
Wrigleyana (Court, 1880, *wrigleyana* group) = *mirabilis* x (*rafflesiana* x *ampullaria*)
? (Schnell, 197_) = *thorelii* x (*maxima* x *stenophylla*)

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 J. A. Mazrimas & Bob Ziemer *Nepenthes*, in World List of Carnivorous Plants, CPN Reprint
 Also general correspondence from Rich Sivertsen and the editors of CPN

***Nepenthes* crosses made at California State University, Fullerton**

by

Leo C. Song, Jr., Supervisor CSUF Greenhouse Complex

Statements as to seed set are subjective, but seem to reflect the fact that crosses made with *N. X dyeriana* result in low seed set. The set rate with *N. X superba-mixta* was low to good, but until this year, only a few crosses have been made using it. note: female (plant on which seed is gathered) is listed first.

- **N. x chelsonii* X *N. x coccinea* on 25 Oct. 1977 — excellent set
- **N. x chelsonii* X *N. x dyeriana* on 21 Aug. 1978 — poor
- **N. x chelsonii* X *N. rafflesiana*-Singapore on 15 Aug. 1978 — ex. set (= *N. x edinensis* reverse)
- N. x chelsonii* X *N. x superba-mixta* in summer, 1976 — poor
- **N. x chelsonii* X *N. x williamsii* on 31 Jul. 1978 — excellent set
- **N. gracilis* X *N. x hookeriana* (cult. type) on 27 Oct. 1978 — ex. set
- N. x intermedia* X *N. x dyeriana* on 08 Aug. 1978 — poor set
- **N. x intermedia* X *N. rafflesiana*-Singapore on 15 Aug. 1978 — ex. set
- N. x morganiana* X *N. x dyeriana* on 09 Aug. 1978 — poor set
- **N. x morganiana* X *N. x williamsii* on 31 Jul. 1978 — ex. set
- **N. rafflesiana-vittata* X *N. x dyeriana* on Aug. 1976 — poor
- N. rafflesiana-vittata* X *N. rafflesiana*-Singapore on 15 Aug. 1978 — ex.
- **N. thorellii*-long narrow X *N. x dyeriana* on 27 Sep. 1976 — poor set
- **N. thorellii*-long narrow X *N. x superba-mixta* during Summer, 1976 — moderate
- **N. thorellii*-short round X *N. x dyeriana* on 19 Sep. 1977 — poor set
- **N. thorellii*-short round X *N. x coccinea* on 09 Dec. 1976 — excellent set
- **N. thorellii-rubra* X *N. rafflesiana*-Singapore on 08 Aug. 1978 — mod.
- **N. thorellii-rubra* X *N. x williamsii* on 08 Aug. 1978 — moderate set

Other crosses involving especially *N. x superba-mixta* were made in January, 1979. The results of these crosses will be reported later this year as well as any others. Some of these seeds have already been distributed to the Seed Bank.

* items means that seed had been germinated and seedlings are growing.

JAPANESE NEPENTHES HYBRIDS

by I. Kusakabe

5-14-6, Chitosedai, Setagaya-ku, Tokyo 157, Japan

(At my request, Mr. Kusakabe provided us a listing of all known *Nepenthes* hybrids made by Japanese breeders from early in this century up to the present time. This list should complement the known lists of *Nepenthes* hybrids made mostly by the British nursery, Veitch, and James Taplin in America. The latter breeder worked for George Such of South Amboy, New Jersey, a short distance from Perth Amboy. Taplin's hybrids were sold to British breeders and, to make matters worse, the names were changed by them so that it becomes quite difficult to trace the history of the crosses originally made in America. If anyone has any more information regarding the Such Nursery, and especially the breeding records of James Taplin, we would certainly welcome (and would like to publish) this information.) J.A.M., ed.

Name	Parentage	Cross Breeder	Year	Raiser	In Existence
<i>Arakunae</i>	<i>mixta</i> X <i>alata</i>	M. Toyoshima	1970	Toyoshima	yes
* <i>Fukubae</i>	<i>mixta</i> X <i>maxima superba</i>	O. Fukuba	ca. 1914	I.B.G.S.	no (ca. 1920)
<i>Fukakusana</i>	<i>rafflesiana</i> X <i>dyeriana</i>	M. Toyoshima	1964	Toyoshima	yes
<i>Fushimienis</i>	<i>globaphora</i> X <i>thorellii</i>	M. Toyoshima	1970	Toyoshima	yes
* <i>Gojimae</i>	<i>Oisoensis</i> X <i>hookeriana</i>	N. Ikeda	ca. 1939	J.H.C.	no
* <i>Ikedae</i>	<i>Oisoensis</i> X <i>dyeriana</i>	N. Ikeda	ca. 1940	J.H.C.	no
* <i>Katajinii</i>	<i>Oisoensis</i> X <i>maxima</i>	N. Ikeda	ca. 1930	J.H.C.	no
* <i>Kikuchiae</i>	<i>mixta</i> X <i>maxima</i>	K. Okuyama	1967	Kikuchi Nur.	yes
* <i>Koisoensis</i>	<i>Oisoensis</i> (self)	N. Ikeda	ca. 1939	J.H.C.	no
<i>Matamiae</i>	<i>thorellii</i> X <i>maxima</i>	M. Toyoshima	1970	Toyoshima	yes
<i>Minamienis</i>	<i>mixta</i> X <i>urigleyana</i>	N. Naito	1964	Minami Nur.	yes
* <i>Mino'o</i>	<i>ventricosa</i> X <i>matteriana</i>	?	ca. 1930	Mino'o-en Nur.	no
<i>Mizubo</i>	<i>rafflesiana</i> X <i>dyeriana</i>	M. Kondo	1965	Kondo	yes
<i>Nagoya</i>	<i>mixta</i> X <i>thorellii</i>	M. Kondo	1967	Kondo	yes
<i>Nagoya</i> var.	<i>mixta</i> X <i>thorellii</i>	M. Toyoshima	1970	Toyoshima	yes
* <i>Nishijimae</i>	<i>mixta</i> X <i>hookeriana</i>	R. Nishijima	ca. 1910	T.B.G.	no (ca. 1930)
<i>Oisoensis</i>	<i>mixta sanderiana</i> X <i>maxima superba</i>	N. Ikeda	ca. 1935	J.H.C.	yes
<i>Princeps</i>	<i>mixta</i> X <i>dyeriana</i>	M. Kondo	1966	Kondo	yes
<i>Rokko</i>	<i>thorellii</i> X <i>maxima</i>	G. Yamakawa	1977	Yamakawa, Kusakabe	yes
* <i>Sakuradae</i>	<i>mixta</i> X <i>maxima</i>	A. Sakurada	ca. 1935	Sakurada	no
* <i>Shinijiku</i>	<i>mixta</i> X <i>urigleyana</i>	Y. Okami	ca. 1930	I.B.G.S.	no
<i>Shioji</i>	<i>mixta</i> X <i>dyeriana</i>	M. Kondo	1966	Kondo	yes
† <i>Shunkyuensis</i>	<i>hookeriana</i> X <i>mixta</i> (?)	K. Suzuki	ca. 1925	Shunkyu-en Nur.	no
<i>Toyoshimae</i>	<i>truncata</i> X <i>thorellii</i>	M. Toyoshima	1970	Toyoshima	yes
* <i>Toyotamaensis</i>	<i>mixta</i> X <i>rafflesiana</i>	R. Nishijima	ca. 1910	T.B.G.	no (ca. 1930)
* <i>Toyotamaensis inversa</i>	<i>rafflesiana</i> X <i>mixta</i>	R. Nishijima	ca. 1910	T.B.G.	no (ca. 1930)
<i>Tsujimoto</i>	<i>matteriana</i> X <i>urigleyana</i>	Takarazuka B.G.	1951	E. Tsujimoto	yes

* = unsubstantiated hybrids picked up from old catalogues and miscellany
 † = Concerning the hybrid, *N. X Shunkyuensis*, Mr. Suzuki, the cross-breeder, stated that the pollen parent may be *N. mixta*. However, in my opinion, this is *N. maxima* because I have never seen a male plant of *N. mixta* in Japan in either living plants or records.

REMARKS:

I.B.G.S. = Imperial Botanic Garden Shinjiku, Tokyo. Mm. O. Fukuba & Y. Okami were superintendents.
 J.H.C. = Japan Horticulture Co. Ltd., Oiso, Kanagawa Pref. President: N. Ikeda; Mm. Katagiri & Gojima were superintendents.
 T.B.G. = Toyotama Botanic Garden, Tokyo. Owner: R. Nishijima
 Shunkyu-en Nursery, Yokohama, Kanagawa Pref. Owner: K. Suzuki
 Sakurada, A., Sendai, Miyagi Pref. (Practitioner)
 Minami Nursery, Hachijo Isl., Tokyo.
 Kikuchi Nursery, Hachijo Isl., Tokyo.
 Mino'o Nursery, Toyonaka, Ohsaka. (Owner: unknown)
 Okuyama, K.: Owner of Isset-en Nursery, Hachijo Isl., Tokyo.
 Kondo, M.: Shioji-cho, Mizuho-ku, Hagoya.
 Toyoshima, M.: Fushimi-ku, Kyoto.
 Tsujimoto, E.: Hamadera, Sakai-City, Ohsaka. He was an authority on *Nepenthes*.
 Takarazuka Botanic Garden: Takarazuka, Hyogo Pref. Owner: Hankyu Electric Railway Co. Ltd.
 Most extinct hybrids died out in the hard winter of 1940 and during 2nd World War by the shortage of fuels and bombing.

A Brief History of *Nepenthes* at Longwood Gardens

By Larry Mellichamp

The following is the result of a personal interview with Mr. Patrick Nutt, Collections Foreman of tropical plants at Longwood Gardens, Kennett Square, Pennsylvania, on July 24, 1978.

Prior to 1956, the Missouri Botanical Gardens in St. Louis had perhaps the finest 20th century collection of *Nepenthes* in the world. The nucleus of their collection had come from a private donation of plants in 1918 and through hybridization and selection a large and varied array of specimens was produced. This was all done under the direction of George H. Pring. When Pring retired in 1950 he went to Longwood Gardens to work on hybridizing waterlilies. He knew that the *Nepenthes* collection at Missouri would begin to decline, and since he was a consultant at Longwood, he decided that he would try to bring them to Longwood to keep them going. Dr. Russell J. Seibert, then and now director of Longwood and Mr. Pring's son-in-law, also had a sentimental feeling for *Nepenthes*, having worked with them as a student. And so the large *Nepenthes* collection was brought to Longwood in 1956.

Pat Nutt, then a young gardener, had worked with *Nepenthes* during his stu-

dent training at Kew Gardens and the Royal Botanic Gardens at Edinburgh, Scotland, and asked to be in charge of them at Longwood. He was working at the time with Mr. Pring on waterlilies. Permission was granted; Pat Nutt inherited the collection from gardener Bruce Scott, and in 1967-68 Nutt began hybridizing the finer *Nepenthes* specimens. This turned out to be a real challenge for two reasons: first, outstanding female *Nepenthes* specimens were rare in collections, as they are now, and second, it was unpredictable when male and female plants of desirable breeding stock would flower at the same time enabling a cross to be made. Since 1955-56 efforts had been made to enlarge the collection by procuring plants from all over the world. In this country outstanding specimens were obtained from Henry Demmink, and many of the rarer female plants were donated by Harvey Dickler during 1966-69. Despite the obstacles, many hybrids were made; some had been produced earlier and some were totally new. Some examples of the Longwood hybrids are:

N. x 'Lt. L. B. Pring' (female) X *N.* x *hookeriana* (male) (Oct. 1969)
N. rafflesiana (female) X *N.* x *hookeriana* (male) (Oct. 1969)
N. x 'Lt. L. B. Pring' (female) X *N.* x *intermedia* (male)
N. x *mixta* var. *sanguinea* (female) x *N.* x *williamsii* (male) (1971 —
last hybrid produced)

Ideally a hybridization program such as this should involve raising as many seedlings as possible, evaluating them for desirable characteristics, and then selecting the best for further propagation and breeding and perhaps naming of any outstanding clones as was done by Pring

at Missouri Botanical Gardens (see Pring, 1950). Unfortunately, shortly after the major hybridization efforts of 1967-69, the U.S. economy began to fail and the energy crisis caused massive energy cut-backs to become necessary. As a result, space became more of a premium, and



Mr. Patrick Nutt and *Nepenthes* at Longwood
photo by L. Mellichamp



N. x superba



N. x superba - mixta
Photos by L. Song

time became more of a concern. Less effort was being directed towards developing and enlarging the *Nepenthes* collection as such, and more was concentrated on displaying what was already on hand. Since Longwood was not a botanical gardens *per se*, maintaining a minimum collection of the finest specimens for public display and teaching would take precedence over large scale research efforts when times got rough.

Mr. Nutt pointed out several of the problems encountered with maintaining the collection at Longwood, which could serve as advice for would-be growers: (1) Having to display the *Nepenthes* along with other plants due to space limitations meant lowering the optimum humidity levels to suit the other plants. (2) Cooler temperatures must be maintained now, which are below the optimum for finest pitcher production in some cases. (3) There is less time now for curating the *Nepenthes*, a group which requires a great deal of careful maintenance for best results. (4) Vandalism can be a problem. Some visitors like to fondle, cut, and squeeze the pitchers, in addition to pouring out the liquid. This necessitates displaying the plants in hanging baskets from the ceiling to prevent close encounters of the worst kind. (5) At one time, there was a serious outbreak of the fungus *Pestalotia* which was impossible to eradicate using normal fungicides like Benlate (which is effective on *Pythium* and other common greenhouse fungi). They finally resorted to Daconil 75-W which did the trick. Pat suggests that the growing area be kept as clean as possible, and that tools be sterilized as often as possible to prevent the spread of disease.

One of the qualities of a good plant hybridizer is his constant alertness for unexpected occurrences, such as the appearance of an unusually robust and easily propagatable specimen which, for example, could be subjected to modern tissue culture techniques which would al-

low them to be mass produced and made commercially available at a lower cost. It is important to maintain the collections that we have right now, because if future times get harder, there will be even less opportunity for hybridizing and selecting of new plants.

Longwood receives many requests for *Nepenthes* from individuals and other gardens — far too many requests to fill; the *Nepenthes* just won't grow fast enough. Longwood's policy is to provide plants (rooted cuttings) on an exchange basis. As of January 1978 the *Nepenthes* collection at Longwood consisted of the following species and hybrids:

Nepenthes alata, *N. albo-marginata*, *N. ampullaria*, *N. X balfouriana*, *N. X boissiensis*, *N. boschiana*, *N. burkei*, *N. X chelsonii*, *N. X coccinea*, *N. X dicksoniana*, *N. X dormaniana*, *N. X dyeriana*, *N. X edinensis*, *N. gracilis*, *N. gracillima*, *N. hirsuta*, *N. hookeriana*, *N. X hybrida*, *N. X intermedia*, *N. kampotiana*, *N. khasiana*, *N. X kosobe*, *N. maxima*, *N. mirabilis*, *N. X mixta* var. *sanguinea*, *N. X morganiana*, *N. X paradisiae*, *N. rafflesiana*, *N. sanguinea*, *N. spectabilis*, *N. stenophylla*, *N. X superba*, *N. thorellii*, *N. trichocarpa*, *N. ventricosa*, *N. X williamsii*, *N. X wittei*, *N. X wrigleyana*, *N. X* 'Lt. R. B. Pring', *N. X* 'St. Louis'

The major achievement of Pat Nutt was to build up and maintain the large *Nepenthes* collection at a time when interest and expertise in growing these beautiful plants could have been lost. You have to have a dedicated and willing staff, he says, in addition to knowledgeable direction, in order to maintain and develop such a collection. Since 1970, gardener Bill Pierson has assumed most of the practical aspects of daily care and culture of the *Nepenthes* collection.

At Longwood the *Nepenthes* are utilized not only for public display, but the Chief Taxonomist, Dr. Huttleston, and other members of the staff use the specimens in their lectures and demonstrations to horticulture students in the Longwood training program. Longwood also maintains an extensive collection of color slides and photographs for use in teach-



Nepenthes williamsii
Longwood Gardens Photograph

ing and public lectures. This is all part of Longwood's outstanding educational program in horticulture which is one of the finest in the country. Mr. Nutt points out that while Longwood has the best collection of *Nepenthes* on display in America, Edinburgh's Royal Botanic Gardens probably has the finest in the world. He emphasized that it is a major undertaking for any institution to commit itself to the proper upkeep of a large collection of plants such as *Nepenthes* which require so much maintenance and care.

Finally, Mr. Nutt briefly indicated the culture conditions employed at Longwood. The growing medium generally consists of 1/2 osmunda fiber and 1/2 sphagnum moss and the plants are grown in wooden baskets. They fertilize every two weeks in summer with Peter's 20-20-20; and every three weeks in winter with 15-0-15. They also prefer to apply fish emulsion periodically in an effort to ensure that trace elements are provided. The plants are heavily cut back about Easter, fertilized regularly, and by the first of June good pitchers are produced. Regular pruning helps keep the plants short and stimulates them to produce luxurious pitchers instead of long vine-like stems. While different species require different temperatures depending on their native habitats, they keep the *Nepenthes* no lower than 62°F in winter (which may actually be too cold for some species). The humidity is kept as close to 80% as possible, with higher humidity being desirable if you are growing *Nepenthes* in a house by themselves. Cuttings are rooted in a mixture of peat and perlite, or peat and calcined-clay, with bottom heat of 75°F and intermittent mist. The cuttings must callous before roots are produced, at which time one must be careful not to let the fine white roots dry out or be broken. For further excellent details of culture Mr. Nutt recommends the articles by Pring and Macfarlane listed below.

For the future, Pat would like to see improvements in propagation techniques and a rejuvenation of hybridization efforts in order to perfect the difficult procedure of cross-pollinating two specimens that tend to flower at different times! He certainly has a keen interest in *Nepenthes* which is conveyed to anyone who talks with him about these very special tropical pitcher plants.

ACKNOWLEDGEMENTS: I wish to thank Dr. Seibert for welcoming us to Longwood Gardens; Mr. Joe Carstens for showing us around the facilities and collections; Ms. Susan Burnett for her help with the slides and photographs; and Ms. Teeter for her assistance in the Longwood library. Longwood also has an interesting and diverse carnivorous plant collection, especially the *Sarracenias*, curated by Mr. Rolfe Smith.

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Coming In The June Issue

Rainforest *Drosera* of
North Queensland by
Dr. P. S. Lavarack

Utricularia by
Bob Hanrahan

Mexican *Pinguicula*s

An Abridged History of *NEPENTHES*¹

By Harry James Veitch (1906)

SPECIES

The first introduced to British Gardens was *Nepenthes distillatoria* [*N. khasiana*], the type species on which Linnaeus founded the genus. A native of Ceylon, this Pitcher had formed the subject of some remarkable writings by early travellers in the East before its introduction to this country and which, according to Aiton, was in 1780. *N. distillatoria* was not the first species known to science, that distinction probably belonging to *N. madagascariensis*, which nevertheless was one of the latest to reach England. *N. distillatoria* was followed in 1826 by *N. gracilis* (under the name *phyllamphora*) and in 1828 by *N. khasiana* three species before the year 1830. These were soon lost to cultivation, their cultural requirements being little understood.

Later followed *Nepenthes rafflesiana* and *N. ampullaria*, discovered by Dr. William Jack in Singapore, the former named in honour of Sir Stamford Raffles, but an attempt to introduce it by the discoverer was unsuccessful. Better fortune attended the labours of Captain Bethune, who brought living plants to Kew in a Wardian case [Victorian terrarium], which he so well cared for that they practically all lived.

In 1847, *Nepenthes hookeriana* was introduced to the Clapton Nursery by Mr. (later Sir Hugh) Low, and shortly afterwards Thomas Lobb sent to Exeter *N. rafflesiana*, *N. ampullaria*, *N. albo-marginata*, *N. veitchii*, *N. phyllamphora*, *N. sanguinea*, and other unnamed species. These formed the nucleus of the large collection since cultivated at Chelsea [at the Veitch nursery].

Nepenthes laevis, sent from Singapore, is figured and described by Lindley in the *Gardeners' Chronicle*, 1848, p. 655, from specimens growing in the houses at Chelsea at that time.

Sir Hugh Low made known four new species in 1851, having discovered them in making the ascent of Kina Balu, a well-known mountain in Borneo. These respectively *Nepenthes rajah*, *N. edwardsiana*, *N. lowii*, and *N. villosa*, were not introduced to cultivation at that time, but sufficient material was sent home to enable Sir Joseph Hooker to write a lucid account of the genus, in a paper read before the Linnaean Society in 1859.

Ten species and four hybrids are enumerated and described by Dr. Masters in the *Gardeners' Chronicle* for 1872, as growing at Chelsea in that year. The species mentioned were *Nepenthes ampullaria*, *N. veitchii*, *N. rafflesiana*, *N. phyllamphora*, *N. khasiana*, *N. albo-marginata*, *N. gracilis*, *N. laevis* and *S. sanguinea*.

During the following ten years some of the finest were introduced by the Veitchian collectors, including *Nepenthes rajah* and *N. bicalcarata* from Borneo through Burbidge; *N. hirsuta* from the same region through another agency; *N. madagascariensis* from Madagascar through Curtis; *N. kennedyana* from North Australia, and *N. viellardii*, a native of New Caledonia, through the Botanic Gardens at Sydney; and *N. northiana* from Borneo, also through Curtis. With a view of obtaining some of those remarkable plants made known through the discoveries of Mr. Low in Borneo, Thomas Lobb, acting under the direction of Mr. James Veitch Junior, reached the foot of Kina Balu in 1856, but was prevented from ascending the mountain by the hostility and extortion of the natives. He was followed in 1877 by Burbidge and P. C. M. Veitch, who met with a like failure, and again by the first-named, eight months later, on which occasion some seed of *N. rajah* was obtained, dispatched to Chelsea, and plants raised, but few lived. *N. rajah* has the largest pitchers of any known species, and these are described in Mr. Spencer St. John's book "Life in the Forests of the Far East": "This morning, while the men were cooking their rice, as we sat before the tent enjoying our chocolate, observing one of our followers carrying water in a splendid specimen of *Nepenthes rajah*, we desired him to bring it to us, and found that it held exactly four pint bottles. It was 19 in. in circumference. We afterwards saw others which were much larger, and Mr. Low, while wandering about in search of flowers, came upon one in which was a drowned rat." *N. albo-marginata* one of the earliest introduced species, previously unknown to science, was one of Thomas Lobb's Bornean discoveries, sent home to Exeter [Veitch nurseries] in 1848. The species is difficult to cultivate, but repays trouble by the great beauty of the pitcher, light green at the base, rosy red at the apex, with a pale band edging the top below the peristome.

¹Hortus Veitchii, 1906.

Nepenthes zeylanica, or as it's sometimes called, *N. hirsuta glabrescens*, and *N. zeylanica rubra*, a red form of the type, were the next introductions, followed shortly afterwards by the handsome, and still rare, *N. veitchii*. Much confusion has arisen regarding the nomenclature of this species, sometimes called *N. lanata* and also *N. villosa*, both in themselves good species.

Nepenthes veitchii was first met with by Hugh Low Esq. Junior, on Mount Kina Balu, Borneo, but not introduced. Later found by the collector Thomas Lobb in Sarawak, living plants sent to Exeter proved one of the most remarkable of all *Nepenthes*: large pitchers covered with hair, a remarkable peristome or frill round the mouth, resembling both in structure and appearance the gills of a fish; the frill cream-coloured, slightly reddish; the habit as in other of the family.

In 1879 *Nepenthes veitchii* was followed by *N. kennedyana*, a species from Cape York, North Australia, sent from the Botanical Gardens, Sydney; the pitchers are over 5 in. in length by 1½ in. in width, reddish in colour, elongate-cylindrical in shape, slightly dilated below the middle and tapering at the base with two sharply fringed wings.

In 1880 Messrs. Veitch distributed and figured in the Catalogue the Bornean species *Nepenthes bicalcarata*, found in Borneo, by Low, Beccari, and other early travellers, but not sent to England till Burbidge found it in the neighborhood of Lazas River. *N. bicalcarata* is peculiar in having two prominent spurs projecting from below the base of the operculum over the mouth of the pitcher, as the head of a snake with projecting fangs and head uplifted about to strike. It is one of the most robust and vigorous of all Pitcher-plants. The *N. dyak* of Mr. S. Le Moore, figured in the *Journal of Botany*, is an immense form of this species.

In 1881 Dr. Masters described in the *Gardeners' Chronicle* a new species raised from seed sent from Sarawak by Curtis as *Nepenthes angustifolia*. Of no value as a decorative plant, it was not distributed. A more important species, one of the first to be known, was also introduced through Curtis, *N. madagascariensis*, not introduced till 1880. The name denotes the island in which it was discovered, the extreme western limit of the *Nepenthes* range. It is at home in fully exposed swamps, and has characters clearly distinguishing it from all other species. The pitchers from 6 to 8 in. long, remarkable for the richness of their coloration, rival in this the *N. sanguinea* of Borneo.

The next important find was *Nepenthes rajah*, a magnificent species already alluded to, named in honour of Rajah Brooke, whose services to its country it commemorates.

In the following year, 1883, *Nepenthes northiana*, a species as wonderful as the last named, was offered to European growers, the specific name commemorating Miss North, the lady through whom it was first made known.

Plant drawings executed by Miss North in Borneo were shown to Mr. Harry Veitch, and one of a curious Pitcher-plant, at that time unknown to science, greatly attracted his attention. Further information was obtained regarding the habitat, and Curtis, about to start on a collecting expedition to Borneo, was commissioned to go in search. After long and unsuccessful effort, Curtis gave up hope, under the impression that Miss North had been wrongly informed, but fortunately before leaving the district it occurred to him to look over a steep escarpment in the hillside, accomplished by lying prostrate on the ground, when to his great joy he discovered the long-looked-for plant some distance below.

He succeeded in gathering ripe capsules, and lost no time in transmitting them to Chelsea, where the seed soon germinated. The pitchers of *Nepenthes northiana* are flask-shaped, striped and spotted with purple on a greenish ground, when mature they are 1 ft. and more long, and 3½ in. in width, with two dentate fimbriate wings. The mouth oblique, surrounded by a broad finely ribbed margin or peristome. The shape variable; the upper pitchers swing in mid-air unsupported, trumpet-shaped, whilst those on the ground are larger and more distended.

Another handsome species, *Nepenthes Curtisii*, was sent from Borneo, and offered in 1888. The pitchers dull green, are thickly spotted with purple. A fine variety of this species, *N. c. superba*, possesses larger and more highly coloured urns than the type.

In the following year Burke collected plants and seeds of two species in the Philippines, one *Nepenthes burkei*, commemorating his labours. Handsome pitchers narrowed in the middle, devoid of the winged appendages common to the majority. A variety *N. b. excellens* is richly coloured and unusually handsome. During this trip Burke also collected a further supply of seed of *N. northiana*, and from this was obtained a distinct plant distributed under the name of *N. cincta*. It is a supposed natural hybrid between *N. northiana* and *N. albo-marginata* (as these two plants grow in company), and from the resemblance *N. cincta* bears to the two species, the inference is reasonable. It

resembles *N. northiana* in leaf and habit of growth, and the pitchers have the white band round the mouth characteristic of *N. albo-marginata*.

Another handsome species, obtained through Mr. Ford, late of the Hong Kong Botanic Gardens, and also from the Royal Gardens, Kew, 1891, is *Nepenthes ventricosa*, a native of the Philippines, one of the most distinct of this remarkable genus. The pitchers, wholly without wings, are curiously contracted in the mid-

dle, with a transverse, not oblique mouth, surrounded by a bright red undulating peristome marked with numerous transverse ribs. The colour delicate pale green with a rosy suffusion at the base, without spots, the pitchers deepening in colour to a deep purplish-rose as they reach maturity.

Many of the species are from various causes now lost to cultivation, or supplanted by hybrids, in most cases easier to cultivate and more decorative.

HYBRIDS

The artificial hybridization of *Nepenthes* was commenced by John Dominy at Exeter [site of the first of the Veitch family nurseries], and continued by Seden, Court, and Tivey at Chelsea.

The dioecious [separate male and female plants] character of the *Nepenthes* renders the pollination of a female flower easy, as emasculation is unnecessary and self-fertilization an impossibility; but there are drawbacks to even these apparently advantageous conditions, the greatest the difficulty often experienced of procuring pollen when a female plant is in flower, and *vice versa*, as the sexes seldom flower at the same time. The methods pursued in cultivating *Nepenthes* as decorative subjects are likewise unfavourable to the production of flowers, as pitchers being the desiderata, plants are subjected to severe pruning, with the object of their production.

The species used by Dominy in the first cross was an unnamed one with green pitchers from Borneo, and *Nepenthes rafflesiana*, the result a plant producing pitchers fairly intermediate in character. Named *N. x dominiana* after its raiser, and distributed in 1862, exhibited at the Royal Horticultural Society's Show, held in June of the same year at Kensington. The second of Dominy's hybrids, *N. x hybrida*, had as parents *N. khasiana* (then known as *N. distillatoria*) and an unnamed Bornean species. The pitchers larger than those of *N. distillatoria*, were bright green. A variety *N. x hybrida maculata* has green pitchers thickly covered with red spots; both were distributed in 1866.

Seden followed Dominy in this interesting work, and obtained his first hybrid, which bears his name, from *Nepenthes khasiana* (*distillatoria*) and an unnamed Bornean species, the same as Dominy employed in producing *N. x hybrida*. The pitchers of *N. x sedenii* are vivid green, splashed with bright crimson spots.

This was followed by *Nepenthes x chelsoni*, also raised by Seden, from *N. hookeriana* crossed with the pollen from *N. x dominii*, a hybrid being used for the first time as a parent.

The work of hybridization has been carried on by succeeding growers whenever staminate and pistillate flowers have been available simultaneously, either of species or of hybrids.

Court, who succeeded Seden, produced several fine hybrids, the first *Nepenthes x intermedia*, the result of crossing an unnamed species with *N. rafflesiana*, followed in 1877 by *N. x courtii*, from the same parentage as *N. x hybrida*.

Nepenthes x stewartii appeared in 1879, from *N. phyllamphora* crossed with *N. hookeriana*, and *N. x ratcliffiana* in 1881 from a similar parentage. The latter dedicated to Alfred E. Ratcliff Esq., of Edgbaston, Birmingham, at that time a distinguished amateur of this interesting race.

The year 1883 is noteworthy for one of the most ornamental and easily grown of all hybrid *Nepenthes*, *N. x mastersiana*, "in compliment to Dr. Masters, of the *Gardeners' Chronicle*, as a slight recognition of his invaluable services to Horticulture." Raised by Court from *N. sanguinea* crossed with *N. khasiana* (*N. distillatoria*, Glasnevin variety, of gardens) the seed remained dormant so long that it barely escaped destruction. Fortunately life was detected at the last moment, and a further trial resulted in a plant which ranks amongst the finest of the genus. *N. x mastersiana* produces pitchers remarkable for a fine coloration, rivalling that of *N. sanguinea*, with the characteristic blotches of *N. distillatoria*. The plant is of a robust constitution, dwarf in habit.

Nepenthes x dicksoniana, offered in 1889, is the offspring of *N. rafflesiana* flowering in the Botanic Gardens at Edinburgh, fertilized by pollen of *N. veitchii* sent from Chelsea. Mr. Lindsay, late Curator of the Edinburgh

Botanic Gardens, effected the cross, and in deference to his wish the seedling bears the name of Proefssor Dickson, formerly Professor of Botany at the University. The pitchers of the hybrid are fully 10 in. long, sub-cylindric, of a light fulvous green, densely spotted and speckled with bright crimson.

George Tivey, to whose charge the *Nepenthes* were eventually entrusted [at the Veitch nurseries] has produced some excellent crosses, the parentage indisputable, a statement which cannot be made without reserve of some of the earlier results, of which records are imperfect, and when the variability both in colour and shape of the pitchers, a marked characteristic of seedling *Nepenthes*, was not so well understood or appreciated.

Tivey's first hybrid, *Nepenthes x mixta*, was from two beautiful species, *N. northiana* and *N. curtisii*, the latter the pollen parent. As might be expected *N. x mixta* is a fine cross, with pitchers 1 ft. or more in length, of a cream-yellow colour suffused with red and blotched as is *N. northiana*. The wings shallow, are deeply laciniated; the ribs, which form the mouth of the pitcher, of a rich shining crimson. It was distributed in 1893. A handsome variety, *N. x mixta sanguinea*, has reddish-brown pitchers spotted with large blotches of chocolate-brown.

The next success was a superb cross from *Nepenthes veitchii* and *N. curtisii*, *N. x tiveyi*, named in compliment to the raiser. *N. veitchii*

is one of the grandest Pitcher-plants in cultivation, remarkable for hairy pitchers and a curious gill-like peristome, and many of the best characteristics have been imparted to the hybrid, the most conspicuous the broad rim round the mouth, richly coloured a deep mahogany-red, with occasional transverse bars of a deeper shade. The pitchers, larger than those of *N. veitchii*, have much the same form, but are on finer lines.

Another beautiful Pitcher offered in 1903 is probably one of the finest hybrid *Nepenthes* in cultivation, a result effected by Tivey between *N. x mixta* and *N. x dicksoniana*, both hybrids. It is named Sir William T. Thiselton-Dyer in honour of the late Director of the Royal Gardens, Kew. The pitchers attain a length of 14 in. or more, are subcylindric in shape, with a handsome peristome or ribbed mouth, the colour bright crimson, and the form undulate as in *N. x mixta*. The ground color of the body is green, the surface irregularly blotched with large spots of purplish or crimson brown. In addition to the ordinary slender spur at the back of the lid, the hump-like process characteristic of *N. curtisii* is prominent.

The majority or all of the hybrids mentioned, raised under artificial conditions in this country, have proved more amenable to cultivation than many species from the equatorial regions, and, from a horticultural point of view, are very much superior.

"This morning, . . . we sat before the tent enjoying our chocolate, observing one of our followers carrying water in a splendid specimen . . ."

Longwood Gardens
Photograph



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NEPENTHES

By Joe Mazrimas

Nepenthes plants are perennial, tropical vines that either grow upward toward the forest canopy clinging to trunks and branches of the forest or snake along the ground with the growing tip raised into the humid air. The plants have a rigid stem which is semi-woody and supports the leaf blade and pitcher. The green or reddish colored stem is usually cylindrical or triangular in cross-section. The leaves are really the expanded center midrib, which is its prominent feature and is continuous with the tendril which supports the true modified leaf, the pitcher.

The shape of the pitcher on any one species of *Nepenthes* usually takes two or three different forms depending on the maturity and position on the plant. The lower pitchers which usually touch the ground are short and jug-like in shape. The aerial pitchers which may develop several feet (a meter) or more above the ground are shaped like funnels with a very narrow bottom or cornucopian in shape. The tendrils of these pitchers are sensitive to touch and frequently are found spiraled around branches of trees. Sometimes, a third form of pitcher which is cylindrical in shape is found developing between the two forms mentioned above, and it's thought to be an intermediate form.

Nepenthes plants are dioecious, which means they exhibit either male or female flowers on separate plants. The flowers have no petals but instead have four insignificant pale green or yellow sepals.

The male sepals have large glands that emit a powerful pungent musty odor. One finds that the stamens are fused together into one column so that the anthers are crowded into a tiny umbrella shape. The umbrella is bright yellow and covered with thousands of pollen grains. The female flower has a central oval-shaped ovary with a central stigma that may be white or yellow in color.

In order to obtain seed, one must transfer pollen from the male plant and firmly stick it to the stigma of the female plant. If successful, the ovary begins to enlarge and when mature, it may be 4 - 6 x larger in size than the unfertilized ovary. The seed capsule is mature when it turns color from light green to light brown which takes about 2-3 months time. The seeds are pale brown color which are about $1\frac{1}{3}$ inch (1 cm) long and are very thin and spindle-shaped. One finds the actual embryo is situated in the center and in fertile seed shows up as a prominent bead. Usually, unfertile seed is smaller and the bead is small or absent.

The roots of *Nepenthes* are fibrous and black in color. The root system is rather extensive in size and somewhat brittle in nature. The root tips are yellowish-orange in color. In fact, the roots on most carnivorous plants are black in color, and a beginner should not mistake this fact for thinking he has a dead plant. Two major exceptions to this are the roots of *Sarracenia* and *Heliamphora*. It's a good idea to look at the root tips which are lighter



Nepenthes female flower
photo by F. Case



Nepenthes male flower
photo by F. Case



N. x nagoya

photo by L. Song

in color which indicates that the roots are alive and well.

Growing *Nepenthes* requires the following factors:

WATER: I use plain tap water to wet the root zone of the plants and spray the leaves daily. My water is about 250 ppm in dissolved salts, and one should water with tepid water at least 60°F or else add hot water to reach this temperature. I water the plants daily during the growing season.

MEDIUM: I grow my plants in a 50-50 mixture of perlite and chopped sphagnum moss or Canadian peat and perlite. Recently, I tried growing the plants in pure vermiculite grade #2 with good results. It's a simple medium offering good drainage and sterile conditions to grow the most fastidious species of *Nepenthes*.

POT: The pot should fit the size of species. I would use a minimum of a six inch pot for the small species such as *N. gracilis*, *N. kampoiana* and *N. gracillima*. I would use large pots for the bigger species such as *N. mixta*, *N. x dyeriana* and *N. maxima*. A ten inch pot is adequate for these plants. It should have large drain holes cut out of the sides for adequate air exchange and drainage.

PROPAGATION: *Nepenthes* are best propagated from cuttings. The terminal cutting with at least two dormant buds is a good place to start. Next, one should allow time for the next dormant buds to grow out to at least 1/2 inch or so before taking another cutting since this physiological response allows the next cutting to root quicker. The cuttings root in the same mediums used above for growth. A plastic bag may be placed over the pot containing the cutting to help you from overwatering the medium during the rooting process. It turns out that the rooting process is promoted in an airy, well-

drained medium that is kept moist but not soggy. Placing the pot over a warm place will promote rooting and you should have roots started in most hybrid cuttings in 2-4 weeks and 4-8 weeks in some species cuttings. As a general rule, hybrid *Nepenthes* grow and root twice as fast as most species plants. You can dip the cutting in a Rootone powder to help promote rooting and retard stem rot.

FERTILIZER: I find that *Nepenthes* growth is stimulated by fertilizers applied to the roots during the growing season. Recently, I found that slow release fertilizers such as OSMOCOTE are very good for promoting fast growth of leaves and pitchers. You can also use fish emulsion and inorganic fertilizers but these must be applied in dilute form more often due to the leaching effect of daily watering.

HUMIDITY: *Nepenthes* will grow and form pitchers when humidity levels are between 80-100%. These levels of humidity can be achieved in a greenhouse by a misting system set on timers that maintain the minimum humidity or with a humidistat. A large terrarium can be constructed rather cheaply out of 1" x 3" lumber and covered with 6 mil polyethylene sheeting. Standard 4-foot fluorescent lighting could be installed to provide adequate light to the limited collection of plants.

TEMPERATURE: In most cases, a night temperature of 65°F (18°C) is considered minimum and a daytime temperature of 70-85°F (21-26°C) is the optimum. The question of growing *Nepenthes* at lower temperatures in the 50°F to 65°F range (10° - 18°C) is a subject that has come up by those growers wishing to grow the plants in unheated or minimally heated greenhouses. With the energy crisis upon us, the question of growing any



Nepenthes x dicksoniana
Longwood Gardens Photograph



Nepenthes ventricosa
Longwood Gardens Photograph

tropical plant now in a fully heated greenhouse is a legitimate subject of debate and discussion. I am in the process of studying this question of growing *Nepenthes* at lower temperatures and over the last few seasons discovered the following facts:

Most *Nepenthes* species I tried to grow with minimum temperature of 45°F (7°C) with an average of 55°F (13°C) seem to do well but the plant grows very slowly. The plant is never killed by the lower temperatures, and it appears that a major change takes place in the appearance of the plant. It seems that the ratio of the leaf length to pitcher length changes significantly. In other words, the leaf length is markedly reduced so that the ratio is nearly one in the plants grown at lower temperatures in comparison to the same species grown at warm, tropical temperatures. Also, if the warm tropical environment is conducive in producing 10-12 new leaves and pitchers during the season, only 2-3 new leaves and pitchers are produced in the plant grown at lower temperatures. Further observations and experiments on selection of more hardy seedlings may result in a plant that can be grown at lower temperatures. We will have more to say about this low temperature growing in the near future.

LIGHT: The most important factor for *Nepenthes* growth is light of the proper intensity. Low light levels are not satisfactory since they produce weak growth and few pitchers. I try to give about 50% sunlight at least 60-75% of the day which promotes good growth and very good pitcher production. Sometimes the leaves of some species get a reddish tinge to the surface when they receive a little more than sufficient light. If you grow them under artificial lights, then they require at least 4 x 40 watt fluorescent lamps about one foot under the lamps. An eighteen hour light-dark cycle

should be sufficient light to produce good pitchers.

FLOWERING: No one knows why and when flowering occurs in *Nepenthes*. In fact, we don't know what factor(s) control the onset of flowering. Obviously, it is due to either some pattern of hormone concentration or light and nutrition levels inside the plant. It is our desire to coordinate the male and female flowering periods so that by pollination more seed will be available to everyone. This is one of the more important investigations that requires a speedy solution.

FUTURE PROJECTS: We should work on getting a cold-adapted *Nepenthes* species or hybrid. We should try and graft several species or more on a common rootstock to conserve space. In addition we should develop dwarf species of the big leaf species. *Nepenthes* plants are fun to grow and we haven't reached the full expectation of their beauty until we experiment with them.

NEPENTHES FROM SEED: In order to have good successful germination of *Nepenthes* seed, the seed MUST BE FRESH. Its germination potency goes down rapidly with time, probably because of its thin seed coat which allows the embryo to dessicate. One can store *Nepenthes* seed in envelopes made from paper in the refrigerator at 40°F (4°C) for as long as 6 months or more and still retain almost full germination potential. To grow from seed, sow the dry seed on the surface of Canadian peat moss which was previously well-soaked in distilled water. Then carefully spray the seed with a fine mist from your handy mist sprayer until the seed looks well-soaked and a darker brown in color. Water the seed thoroughly daily but try to be careful not to disturb the location of

(Please turn to Page 39)



BOTANIST'S CORNER

by Larry Mellichamp

Botanical History of CP III: *Nepenthes*

Nepenthes! What extraordinary plants. How the first naturalist to see them must have marveled at their beauty and been intrigued by their unique pitchers. The fact that many of them grow in the un-accessible remoteness of Borneo — where stories of cannibals and fear of the unknown threatened every 19th century expedition to procure them — just made them appear that much more exotic and mysterious when brought back to civilization for the first time at Kew Gardens in London.

The year was 1789 when *N. phyllamphora* (now known as *N. mirabilis*), the most widely distributed species (and therefore perhaps the most tolerable of a range of culture conditions) was first cultivated at Kew. Prior to this time attempts at cultivation were generally unsuccessful, due probably to a lack of knowledge of the natural growing conditions and the primitive state of the art of greenhouse construction and management. After 1830, however, the level of technology became such that there was literally a boom in *Nepenthes* culture. Many new species were introduced and successfully grown, seeds could be germinated; and hybridization began which was to continue at an unprecedented rate for the next 100 years producing some of our most magnificent and easily-grown specimens.

Let us go back for a moment and consider the origin of the generic name "*Nepenthes*." (The first *Nepenthes* was actually discovered on Madagascar in 1658 and named *Amramitico*, a name which did not stick.) The name "*Nepenthes*"

comes from the Greek and means literally "without care." Linnaeus named the genus officially in 1753 in allusion to the story in Homer's *Odyssey* where Helen mixed the wine with the drug *Nepenthe* so that by drinking it, man would be freed from care and grief. Linnaeus expressed the feeling that some travelers have experienced since when he wrote:

"If this is not Helen's *Nepenthes*, it certainly will be for all botanists. What botanist would not be filled with admiration, if after a long journey he should find this wonderful plant? In his astonishment past ills would be forgotten when beholding this admirable work of the Creator."

In addition, I found the following poem in an 1849 issue of the *Gardener's Chronicle*, a very famous British weekly horticultural newspaper:

"Botanists call these plants *Nepenthes*

Not that *Nepenthe* rare

When as Don Homer sings high pleasures grew,

And sweet oblivion of all earthly care,
Fair gladsome waking thoughts,

And joyous dreams more fare."

I think we would have to agree that the sight of these marvelous plants would cause us mild shock and awe; and there is certainly the possibility that we might be lightly drugged if we indeed drank of the liquid in the pitchers. (See article by Paul Zahl, *National Geographic*, 1964, pp 680-701).

While the 300 year history of *Nepenthes* is quite varied and involves many personalities, when considering the 19th

century "Golden Age" of *Nepenthes* in England, three famous personalities stand out and seem to appear constantly in the literature. These are Sir Joseph Dalton Hooker of Kew Gardens, Harry James Veitch of Veitch & Sons nursery, and Maxwell Tylden Masters, botanist.

Sir Joseph Hooker, and his father, Sir William Jackson Hooker, were intricately linked with the establishment and early success of London's famous Kew Gardens (officially called the Royal Botanic Gardens at Kew). Kew Gardens began in the early 1700's as a small royal estate belonging to British nobility. In 1759 nine acres were set aside as a botanic garden. In 1772, King George III (of Revolutionary War fame) inherited the estate and in subsequent years this private garden built up a rich array of new and exotic plants sent by collectors from all over the world. After 1820, however, the garden fell into disuse, its purpose was ill defined, and the government was concerned as to what to do about it. Then in 1841 Sir William Hooker, who had spent 20 years developing the Royal Botanic Garden at Glasgow, was appointed director. It was his idea to build Kew into *the* national center for botanical and horticultural research and make it the finest institution of its kind in the world — which he did. He added hundreds of acres to the property, built new greenhouses, and hired capable gardeners.

Thus the setting for the large palm house (200 feet long and 40 ft. high) and numerous other display greenhouses amidst the richly landscaped terrain which we see today was begun in the mid-1800's.

J. D. Hooker took over as director in 1865, continuing his father's excellence in making Kew a luxurious garden whose vast collections of living plants, both under glass and in the open, were made available for public display and horticultural research. In addition to being deep-

ly involved with Kew — he actually designed garden layouts and led tours around the grounds — he became famous as a botanist and world traveler. He wrote many books and papers concerning the plants encountered on his travels.

Charles Darwin, a lifelong friend of Hooker, recognized him as a great influence on the development of his ideas on nature and evolution.

Nepenthes were one of Hooker's favorite groups of plants, he being the first botanist to describe in detail the unusual nature of the development of the pitcher-leaf. Hooker also wrote the first comprehensive monograph on the genus in 1873 in which he recognized some 33 distinct species. Sir Joseph is commemorated by the species name *Nepenthes hookeriana* and the hybrid *N. X hookerae* (*N. rafflesiana* X *N. mirabilis*). In 1896 a new *Nepenthes* house was built at Kew and at that time contained the following species and hybrids (list as appeared in Kew Bulletin, 1897, page 405):

SPECIES

Nepenthes albomarginata (Singapore)
 ampullaria (Malaya)
 bicalcarata (Borneo)
 burkei (Borneo)
 — var. excellens
 cincta (Borneo)
 curtisii (Borneo)
 — var. supurba
 distillatoria (Ceylon)
 gracilis (Borneo)
 hirsuta (Borneo)
 kennedyana (Australia)
 laevis (Malaya)
 northiana (Borneo)
 obrieniana (Borneo)
 pervillei (Seychelles)
 phyllamphora (Cochin China)
 rafflesiana (India)
 — var. elongata
 — var. hookeriana
 sanguinea (Malaya)
 stenophylla (Borneo)
 veitchii (Borneo)

HYBRIDS

Nepenthes X amesiana
 atrosanguinea

chelsoni
 coccinea
 cylindrica
 dicksoniana
 dominii
 edinensis
 formosa
 henryana
 hookerae
 intermedia
 mastersiana
 — var. purpurea
 mixta
 morganae
 ratcliffiana
 rufescens
 stewartii
 sedeni
 — var. rubra

Harry James Veitch was born in 1840 at Exeter, England and died in 1924. In 1858 he joined his father, James Veitch, in conducting a nursery business at Chelsea which was probably the most famous in the world until it came to an end with J. H. Veitch's (his nephew) retirement in 1914. No one in English horticulture has ever equalled the career of Sir Harry Veitch in combined length, activity, and importance. (The closest in America today would probably be someone like David Burpee, of Burpee Seed Co.) From the beginning a very close relationship existed between the Hookers of Kew and the establishment of the "Messrs. Veitch", as the family nursery (J. H. Veitch & Sons) was frequently referred to in literature of the day. The Messrs. Veitch were directly associated with much of the exploration and importation of new and rare plants during the mid- to late 1800's. Sir Harry himself often made the collecting trips; on other occasions the nursery sent its own chosen collectors. They were also well-known for their ability to cultivate the many wondrous plants brought back from the tropics in their heated greenhouses, or "stoves" as they were called. Much trading was done between the Veitch nursery and Kew Gardens, and it would be safe to say that the Messrs. Veitch were responsible for

the outstanding *Nepenthes* collection at Kew. They were the most prominent firm involved in early growing and hybridizing of *Nepenthes*, Orchids, Amaryllis, Rhododendrons, and Begonias. The first *Nepenthes* hybrids were produced at the Veitch nursery about 1860 by Dominy.

Two literary works were published while Sir Harry was head of the firm: "The Manual of Coniferae" (1881) and "The Manual of Orchidaceous Plants" (1887-94) — a classic in its field. The fact that Sir Harry and his associates personally visited the habitats and studied the plants made it possible for them to grow them so well and to write so authoritatively on their subjects. The pages of the *Gardener's Chronicle* during the latter half of the 19th century were never without some reference to the Messrs. Veitch, and almost every issue depicted some new and interesting *Nepenthes* species or hybrid which they were making available to gardens and individual growers (wealthy ones, of course).

The careers of James H. Veitch and Sons is recorded in a handsome book, *Hortus Veitchii* (literally "plants cultivated by Veitch") published in 1906. It related the history of their travels, collections, and successes in cultivating rare plants. The name Veitch is commemorated in *Nepenthes veitchii*.

Dr. M. T. Masters (1833-1907) was a botanist of some importance in the late 1800's. He was educated first as a medical doctor, as was not uncommon for early botanists, but is best known for his numerous botanical and horticultural writings during his years at Kew Gardens. He became editor of the prominent *Gardener's Chronicle* in 1865 and his name appears often in it for contributed articles. His favorite groups of plants included *Nepenthes* and *Sarracenia*. While not prominent as an explorer or cultivator of

pitcher plants, he was most active during the time when interest in these plants was at its peak and much hybridizing was being done in both *Nepenthes* and *Sarracenia*. He certainly aided in describing, recording, and publicizing much of the important information about these plants. He is commemorated by the hybrid *N. x mastersiana* (*N. sanguinea* X *N. khasiana*).

Another very important personality associated closely with the pitcher-leaved carnivorous plants around the turn of the century was John M. Macfarlane. He has certainly not been forgotten; indeed, his life and achievements warrant a separate article at a later date.

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Nepenthes maxima: Basal (left), Climbing (right)
Nepenthes superba: Basal (left), Climbing (right)
 Longwood Gardens Photograph.

Review of Recent Literature

Miller, S. F. Collectors gobble up Carnivorous Plants. *EnviroSouth Magazine*, Vol. 2, No. 3, 1978.

The Author discusses the possible extinction of several *Sarracenia* species, *Dionaea* and *Pinguicula* species in the U.S. due to commercial collecting, herbicide spraying and urban or road expansion. She quotes extensively from the New York Botanical Garden article written by George Folkerts who describes in detail how each of the threatened or endangered species of CP reached that status. Two color photos accompany this thoughtful article.

Robins, R. J. Studies on Secretion and Absorption in *Dionaea muscipula* Ellis. Pembroke College, Trinity, England, 1978.

(The full thesis, of which this is an abstract, will be published late in 1979.)

The ultrastructure and physiology of the secretory glands of *Dionaea muscipula* Ellis (The Venus's Flytrap) have been examined in order to investigate the mechanism of obtaining nutrients practised by this plant.

The dynamic changes in the ultrastructure following stimulation have been examined. Particularly prominent features are a decrease in the size of the main cell vacuole and an increase in smaller vacuoles. Important changes are also observed in the distribution of ribosomes within the secretory cells. By the use of high resolution histochemical, cytochemical, and autoradiographic methods, it is shown that the secretory hydrolases are probably stored in a sub-compartment of the vacuole, the smooth endoplasmic reticulum and the cell walls. It is shown by quantification of the cell and by autoradiography that the dictyosomes do not appear to be involved in the discharge of secretion, but

rather that this probably occurs both by direct fusion of the endoplasmic reticulum with the plasmalemma and by the migration of vesicles derived from the endoplasmic reticulum directly to the cell periphery.

Evidence is presented to show that, in addition to being released from a site of storage, some of the protein discharged is synthesized *de novo* during the cycle. This is suggested by the observed formation of numerous polysomes associated with the endoplasmic reticulum in the secretory cells and confirmed by radiolabelling techniques.

A preliminary analysis of the enzymology of the secretion is presented and it is tentatively suggested that there are several peptide hydrolase activities present, possibly including a serine proteinase and a carboxypeptidase. It is shown that the secretion can hydrolyse chitin and has peroxidase activity.

By following the absorption of chloride ions, it is shown that the plasmodesmata are important in the uptake of these ions. The overall architecture of the gland is considered in relation to the possible pathway of absorption of digestive products and it is suggested that the plasmodesmata are probably the primary route for the movement of nutrients into the glands.

A model is put forward, based on these observations, for the way in which the gland conducts a bi-directional flow of material. It is hypothesized that, while absorption takes place via the symplast, secretory proteins are discharged directly into the apoplast and flushed from there by hydrostatic pressure generated by the inner secretory cells. Suggestions are made for how this might be achieved.

Wallace, Robert L. 1978. Substrate selection by larvae of the sessile rotifer

Ptygura beauchampi. Ecology 59:221-227.

The above species of rotifer is chemotactually attracted by gland hair secretions to its preferred substrate, the trap door region of *Utricularia vulgaris*, activities beginning while the animal is

still a larva. The animal bypasses four co-occurring *Utricularia* spp. with a very similar gland hair and trap door structure, indicating that the stimulus is chemical in nature. This symbiotic relationship is commensal since the plants are apparently not affected by rotifer colonization.



*Nepenthes
burkei*

Longwood Gardens
Photograph

NEWS AND VIEWS (continued from page 7)

whole summer's growing time, and so now I am collecting rain and snow. I suggest an inexpensive aquarium pH test kit in order to check the water you're using for CP.

I have read that *Dionaea* is not self-pollinating. I found this statement to be untrue in cultivation. I had seed from a hand-pollinated flower that I self-fertilized; now I have a container of seedlings to prove it. There was no chance of cross-pollination since only one plant was flowering at the time, and it was sealed in an indoor terrarium.

ROBERT SYRLIK (217 Drake Ave., Apt. 3J, New Rochelle, NY 10805) reports that in the November issue of "House Plants and Porch Gardens" there is an article on how to build a side lit table garden. With a few modifications, it would make a very good terrarium for CP, especially if growing space is limited. The instructions are very easy to follow. By the time this is published, the November issue will be a back issue, which can be obtained from: House Plants and Porch Gardens, Box 428, New Canaan, CT 06840.

THE 1979 LIST OF CP BOOKS

Not available through CPN. Order direct from publisher or your local bookshop.
 * == books intended primarily for children.

<i>Title</i>	<i>Author</i>	<i>Publisher</i>	<i>Source — Cost</i>
1. Insectivorous Plants	Charles Darwin	AMS Press 1893	AMS Press 56 E. 13 St. N. Y., NY 10003. \$27.50
2. Plants of Prey in Australia	Rica Erickson	Univ. of W. A. Press 1968	World Insectivorous Plants Rt. 3, Box 338S, Arroyo Grande, CA 93420. Cloth, \$12.00 ppd. Dover Pub., Inc. 180 Varick St. N. Y., NY 10014
3. Carnivorous Plants	F. E. Lloyd	Dover Pub.	Soft cover (1976) \$4.50 N. Y., NY 10019. \$1.25 241 First Avenue Minneapolis, MN 55401. \$3.95 Peter Paul Nurseries \$6.30
4. Carnivorous Plants	Randall Schwartz	Avon Books (soft cover) 1975	666 Fifth Avenue N. Y., NY 10003. \$4.50 845 Third Avenue N. Y., NY 10022. \$4.90 Thomas Nelson 407 7th Ave. S. Nashville, TN 37203. \$7.95 1406 Plaza Dr. SW Winston-Salem, NC 27103 \$19.95 (+ 35¢ postage) Garden City, NY 11535 \$7.95
5. Plants that Eat Insects: A Look At Carn. Plts.*	Anabel Dean	Lerner Publications 1977	
6. The World of Carnivorous Plants	J. and P. Pietropaolo	R. J. Stoneridge 1974	
7. Insect-Eating Plants*	L. and G. Poole	T. Y. Crowell 1963	
8. Carnivorous Plants*	John F. Waters	Franklin Watts, Inc., 1974	
9. Plants that Eat Animals*	J. H. Prince	Nelson 1978	
10. CP of the U.S. and Canada	D. E. Schnell	John F. Blair Publisher 1976	
11. Cultivating Carnivorous Plants	Allen Swenson	Doubleday & Co. 1977	
12. Animals & Plants that Trap*	Phillip Goldstein	Holiday 1974	Holiday House, Inc. 18 E. 53rd St. N. Y., NY 10022. \$5.95

CP SOURCES

by Robert Allen

*Catalogue and
Price Range**

Stock

Name and Address

Arthur E. Allgrove North Wilmington, MA 01887	25¢ med. prices	<i>Drosera, Dionaea, Sarracenia, Pinguicula, live Sphagnum</i>
Black Copper Kits 266 Kipp St. Hackensack, N.J.	25¢ low prices	<i>Sarracenia, Dionaea, Drosera, Darlingtonia, Pinguicula</i>
Carolina Exotic Gardens P.O. Box 1492 Greenville, N.C. 27834	75¢ greenhouse grown and propagated low-med. price	<i>Dionaea, Drosera, Sarracenia, Darlingtonia, Pinguicula, Utric- ularia, live Sphagnum</i>
Country Hills Greenhouse Rt. 1 Corning, OH 43730	\$1.50 refundable with order	<i>Nepenthes</i>
Exotic and Bizarre Plant Nursery Wandean Road Bullsbrook East West Australia 6084	inquire	<i>Cephalotus, Drosera, Byblis, Nepenthes</i>
Jerry Horne 10195 Southwest 70th St. Miami, Fla. 33173	inquire prices unknown field collected	Various species of <i>Nepenthes</i> — available seasonally.
Marcel Lecoufle 5, Rue de Paris 94470 Boisse St. Leger FRANCE	inquire med-high price	<i>Cephalotus, Darlingtonia, Dros- era, Dionaea, Pinguicula, Nepenthes, Sarracenia.</i>
Northrop's Insectivorous Plant Farm P.O. Box S Hamstead, NC 28443	inquire low-medium prices greenhouse grown and propagated	Terrariums, indoor greenhouses, <i>Dionaea, Darlingtonia, Sarrac- enia, Drosera, Pinguicula.</i>
Peter Pauls Nurseries Canandaigua, NY 14424	25¢ med. price	<i>Sarracenia, Dionaea, Drosera, Utric. Darlin., Nep. seed, Ping., live Sphagnum.</i>
Plant Shop's Botanical Garden 18007 Topham St. Reseda, CA 91335	\$1.00 refundable with order. med-high price greenhouse propagated	<i>Drosera, Byblis l., Ping., Sarr., Nepenthes, Cephalotus, Dionaea, Utricularia.</i>
Sun Dew Environments P.O. Box 111 Denver, NY 12421	50¢ low price	<i>Cephalotus, Dionaea, Drosera, Ping., Nep., Sarracenia, Utric. & Byblis liniflora.</i>
Sunrise Plants 54 Robbinsville-Allentown Rd. Robbinsville, NJ 08691	35¢ low-med prices greenhouse grown	<i>Pinguicula, Drosera, Darling- tonia, Dionaea, Sarracenia, Nep. khasiana.</i>
World Insectivorous Plants Route 3, Box 338-S Arroyo Grande, CA 93420	50¢ low price greenhouse grown and propagated	<i>Dionaea, Drosera, Drosophyl- lum, Nepenthes, Sarracenia, Dar- lingtonia, Aldrovanda, Poly- pompolyx, Pinguicula, Ceph- alotus, Byblis l., Utricularia, Heliamphora.</i>

* Low prices are under \$2.50 per plant. Medium prices are \$3.00-\$5.00. High prices are above \$5.00.



WANT ADS

When submitting Want Ads, please be sure to print clearly for best results and to eliminate mistakes. Please circle the correct letter before each item (Want, Trade, Sell or Buy). Want ads are limited to carnivorous plants, terrariums, greenhouses and moss. There is a charge of ten cents per item, with no limit to the number of items you may submit per issue.

Send coin or check to:
Arboretum, Want Ads
California State University
Fullerton, CA 92634

Bill Barnett, 15 Hermann St. #210, San Francisco, CA 94102: (WB) *Pinguicula gypsicola* *Heliophora* ssp., *Utricularia reniformis*, *U. nelumbifolia*, information on epiphytic CP.

Walter Greenwood, 1838 Menold Court, Allison Park, PA 15101: (TS) *Aldrovanda vesiculosa*, *Cephalotus follicularis*, *Drosera hamiltonii*, *Nepenthes gracilis*, *N. hamptiana*, *N. khasiana*, *N. "Kosobe"* and miscellaneous other *Nepenthes*, *Utricularia cornuta*, *U. tricolor*. (WTB) *Heliophora* (any species), *Nepenthes*, *Byblis gigantea*, uncommon *Drosera*, Australian CP.

Steve Hawkins, Rt. #4, Forest Hills, Marion, NC 28752: (WB) *Nepenthes ampullaria*, *N. sanguinea*, *N. villosa*, *N. gracilis*, *N. lowii*, *Sarracenia oreophila*, *S. purpurea* x *minor* (cuttings, seeds). (WB) *Heliophora*, *Drosera regia*, *D. burmanni*, *Sarracenia rubra*, *N. rafflesiana*, *N. fusco* (plants, seeds, cuttings).

Marie Santos, 53 S. Covert Ave., Elmont, NY 11003: (B) *Heliophora* plant

Steve Smith, Rd #1, Box 296, Kirkwood, NY 13795: (WBT) *Nepenthes villosa* seedling or cutting, *Heliophora* cutting

THE CPN SHOP

This year there are three new books on CP written by Japanese authors. All of them are written in Japanese but they are generously interspersed with excellent pictures both in color and B&W. The prices include all postage and insurance costs (both overseas and domestic). Please send your check or money order to J. A. Mazrimas before May 1, 1979. The books will be ordered at that time; you should expect a delay of two to three months before you receive the books. All books are sent by surface mail.

Author	Title	Pages	Price
Asashi	<i>Aldrovanda vesiculosa</i> at Hanyu-City	32	\$ 6.50
	Plants of the World #9 (<i>Utricularia</i>), #46 (<i>Cephalotus</i>), #64 (<i>Drosera</i> , <i>Nepenthes</i> , <i>Sarracenia</i>)		2.50 ea.
	Garden Life, Vol. 7, 1977 (Magazine)		5.00
	Carnivorous Plants, Observation and Cultivation	160	4.50
Komija, S.	Examination Notes on Carnivorous Plants	90	4.50
Komija, S. & Shimizu, K.	Carnivorous Plants	292	10.00
*Kurata, S.	<i>Nepenthes</i> of Mt. Kinabalu (in Eng.)	80	5.00
Shimizu	The Mystery of Carnivorous Plants	54	5.50
Suzuki	Insectivorous Plants (Cult. and Coll.)	168	3.25
Yamakawa, G.	Insectivorous Plants	152	3.75

*This book, which is written in English, is available from: World Insectivorous Plants, Rt. 3, Box 338S, Arroyo Grande, CA 93420



David W. Taylor

became interested in CP ten years ago when he purchased some *Dionaea* bulbs. As it was impossible to get other species of CP in England, he was almost at the point of giving up the idea of collecting them. As a member of the Royal Horticultural Society he advertised for material in the society journal. Warren P. Stoutamire saw this, and wrote with an offer of help. Mr. Stoutamire also mentioned CPN which had been started in that particular year. So David became the first private CP collector in England to subscribe to CPN. He is also a founder member in the newly formed CP society in England. David grows his plants in two greenhouses, one of which he made himself (see picture). He lives with his wife Diana and four children in a pleasant suburb just a few miles from London's Heathrow airport. He is self-employed as a specialist in the restoration of bows for stringed musical instruments.

Beginner's Corner

(continued from page 27)

the seeds on the peat surface. In 3-6 weeks you should have most of the seed germinated. The temperature here was an average 75° F (23°C) and the humidity averaged 85%. If your humidity is lower, I would recommend a plastic bag be placed over the pot. I did not have to spray any type of fungicide on the seed since fungus was never a problem.

Errata

We wish to apologize for the transposition of photos in Richard Adams' article "The SEM: Seeing a New World" (CPN 7:110). The caption which appears on page 110 refers to the photo on page 114; the caption on page 115 refers to the photo on page 111.

In the Want Ads (CPN 7:104), Chris Tate's ad should read: (WB) Plants or seeds of *Cephalotus*, *Heliophora nutans*, *Nepenthes rafflesiana*.



LIBRARY

MAY 4 1979

NEW YORK
BOTANICAL GARDEN

Nepenthes thorellii — short round pitchers X *N. x coccinea* hybrid
also made at California State University, Fullerton by L. Song.
This cross is a very vigorous grower.

Photo by J. Mazrimas